Scotch-Weld™
Structural Plastic Adhesive
DP-8005 Translucent • DP-8005 Black

Technical Data **January, 2003**

Product Description

3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005 is a two-part acrylic-based adhesive (10:1 ratio by volume) that can bond many low surface energy plastics, including many grades of polypropylene, polyethylene, and TPO's without special surface preparation.

Scotch-Weld DP-8005 can replace screws, rivets, plastic welding, and two-step processes which include chemical etchants, priming or surface treatments in many applications.

Features

- Ability to Bond Dissimilar Substrates
- Ability to Structurally Bond Polyolefins
- Room Temperature Cure
- Excellent Water and Humidity Resistance
- Very Good Chemical Resistance
- One Step Process - No Pre-Treatment of the Substrates Needed
- Solvent-free Adhesive System
- Convenient Hand-Held Applicator System
- Available in Bulk

Typical Uncured Physical Properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Product		**Translucent**	**Black**
Color	Base (B) Accelerator (A)	Amber White	Black White
Lbs./gal.	Base (B) Accelerator (A)	8-8.4 8.75-9.15	8-8.4 8.75-9.15
Viscosity (cPs.)(1)	Base (B) Accelerator (A)	17,000-30,000 35,000-55,000	15,000-30,000 35,000-55,000
Base Resin	Base (B) Accelerator (A)	Methacrylate Amine	Methacrylate Amine
Mix Ratio (B:A)	By Volume By Weight	10:1 9.16:1	10:1 9.16:1
Full Cure Time @ 73°F (23°C)		8-24 hrs.	
Time to Handling Strength (50 psi @ 73°F [23°C])		2-3 hrs.	
Work Life at 73°F (23°C)		2.5-3 min.	

(1) Viscosity obtained by Brookfield, DV-II, #7 Spindle, 20 rpm at 75°F (24°C).

The accelerator formula is common to both DP-8005 Natural and DP-8005 Black

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	Translucent	Black
Color	Yellow	Black
Shore D Hardness (ASTM D-2240)	55	60
Tg onset (°C)(2)	33	
Coefficient of Thermal Expansion (ppm/°C)(2) Below Tg Above Tg	 125 170	
Mechanical Properties(3) Strain at Peak Load Stress at Peak Load (psi) Modulus at 1% Strain (psi)	 5.3% 1889 85,669	 4.5% 1692 58,782

(2) Tg and CTE determined by TMA -40°F to 249°F (-40°C to 120°C) at 10°F (5°C)/min. (after 2 heat cycles).

(3) Mechanical properties obtained using a Sintech 5GL Mechanical Tester. Approximate dimensions of the test specimen was 1.5" x 0.5" x 0.3". Elongation was determined by crosshead displacement. The crosshead velocity was 0.5"/min.

Typical Adhesive Performance Characteristics

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Overlap Shear (OLS) Strength in psi(4)

Substrate	Temp	Translucent	Black
HDPE	75°F (24°C)	1000 SY	998 SY
PP	75°F (24°C)	1040 SF	1066 SY
UHMW PE	75°F (24°C)	770 SY	757 SY
LDPE	75°F (24°C)	330 SY	350 SY
ABS	75°F (24°C)	970 SF	1575 SF
Polycarbonate	75°F (24°C)	850 SF	1102 AF
PMMA	75°F (24°C)	810 SF	1093 SF
Rigid PVC	75°F (24°C)	1540 SF	1770 SF
HIPS	75°F (24°C)	550 SY	483 SY
G-FRP	75°F (24°C)	2370 CF	2514 CF
HDPE/HDG	75°F (24°C)	985 SY (HDPE)	865 MM
HDPE/Galvanealed	75°F (24°C)	970 SY (HDPE)	1043 SY (HDPE)
HDPE/CRS	75°F (24°C)	970 SY (HDPE)	1028 MM
Oily HDG	75°F (24°C)	2150 CF	1223 MM

SY = Substrate Yield
SF = Substrate Failure/Break
CF = Cohesive Failure
MM = Mixed

(4) Overlap Shear Test Method: overlap shear test for adhesion determined in accordance to ASTM D1002, sample dimensions were 1" x 4" x 1/8", with a 1/2 square inch of area of overlap, bonded to themselves unless otherwise noted, allowed to cure for at least 16 hours at 75°F (24°C) before testing. Data were collected using a Sintech 5GL Mechanical Tester with a 2000# or 5000# load cell. Test rate was 0.5"/minute. Strength determined at 73°F (23°C) unless otherwise noted.

Typical Adhesive Performance Characteristics ***(continued)***

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

T-Peel Bond Strength in pli[5]
3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005

Substrate	Temp	Translucent	Black
HDPE	75°F (24°C)	10 C sh	9 C sh

C sh - Cohesive but shocky

(5) Peel tests on 0.02" HDPE, 0.017" bondline thickness, 8" x 1" in T-peel mode at a rate of 2.0"/min.

OLS Bond Strengths (psi) on HDPE After Environmental and Chemical Exposure Test[6]

Condition	Time	Temp	Translucent	Black
Control	14 days	75°F (24°C)	980 SY	1001 SY
160°F/100% RH	14 days	160°F (71°C)	810 SY	918 CF
160°F Water Soak	14 days	160°F (71°C)	978 CF	1007 CF/SY
10% NaOH	14 days	75°F (24°C)	960 SY	1028 SY
16% HC1	14 days	75°F (24°C)	970 SY	1016 SY
20% Bleach	14 days	75°F (24°C)	980 SY	1018 SY
IPA	14 days	75°F (24°C)	940 SY	994 CF/SY
Antifreeze	14 days	75°F (24°C)	960 SY	1024 SY
Gasoline	14 days	75°F (24°C)	150 CF	320 CF
Diesel Fuel	14 days	75°F (24°C)	840 CF	878 SY
Toluene	14 days	75°F (24°C)	14 CF	23 CF

SY = Substrate Yield
CF = Cohesive Failure
CF/SY = Substrate elongated before bond failed cohesively.

(6) Environmental tests were conducted by immersing bonded coupons of HDPE and subsequent testing in accordance with footnote 4.

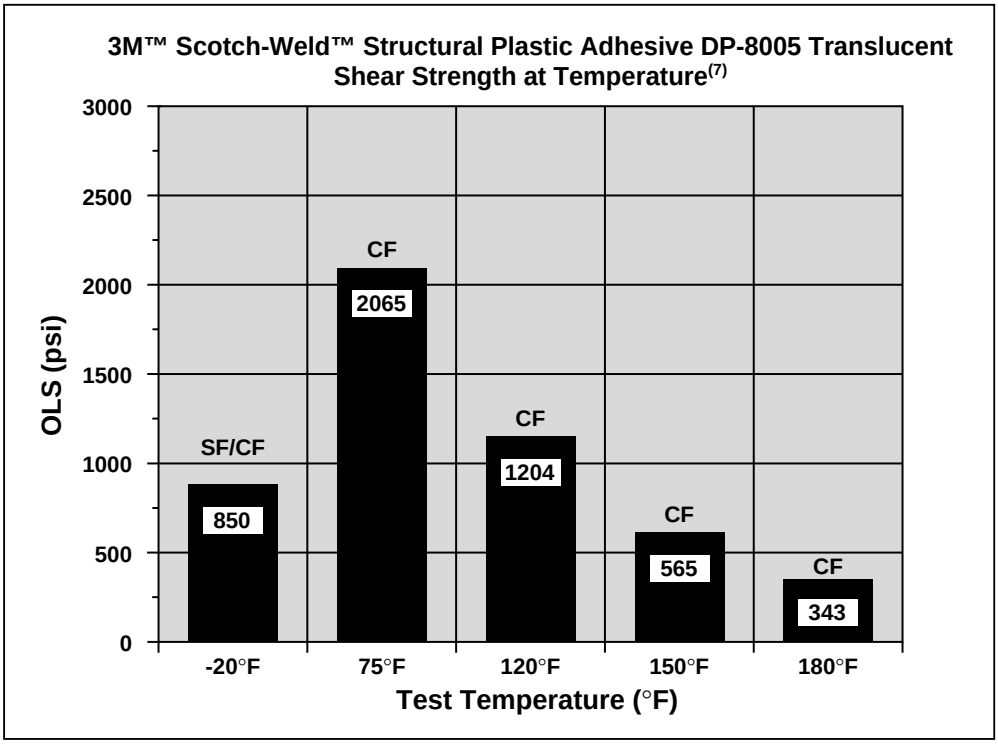
OLS Bond Strengths at Elevated Temperatures[7]

Test Temperature	Translucent HDPE	Black HDPE	Translucent G-FRP	Black G-FRP
-20°F (-29°C)	624 ± 45 CF	765 ± 68 CF	849 ± 64 MM	756 ± 88 AF
73°F (23°C)	932 ± 12 SY	966 ± 19 SY	2065 ± 153 CF	2468 ± 60 CF
120°F (49°C)	594 ± 8 CF	555 ± 25 CF	1204 ± 153 CF	1104 ± 104 CF
150°F (66°C)	378 ± 12 CF	358 ± 15 CF	565 ± 44 CF	617 ± 84 CF
180°F (82°C)	236 ± 15	235 ± 14 CF	343 ± 56 CF	439 ± 40 CF

OLS bond strength expressed in psi.
SY = Substrate Yield
CF = Cohesive Failure
MM = Mixed Mode
AF = Adhesive Failure

(7) Temperature resistance tests were conducted at specified temperature in accordance with footnote 4.

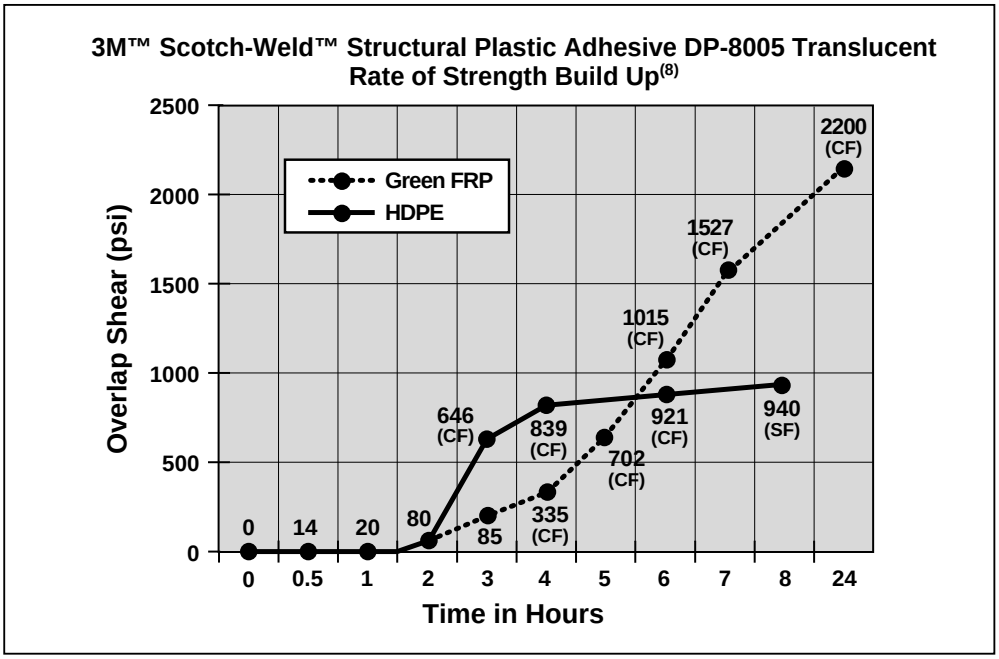
Figure 1
BSI 118505-9



SF = Substrate Failure
CF = Cohesive Failure

(7) Temperature resistance tests were conducted at specified temperature in accordance with footnote 4.

Figure 2
BSI 118505-52



(8) Rate of strength testing done using overlap shear test described in footnote 4.

Suggested Substrates

Note: The following suggestions are based on laboratory tests on typical grades of the listed substrates. Because of the many combinations of process aids and additives that are used with plastic substrates, the user is responsible for determining whether 3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005 is appropriate for a given application.

Potential Primary Surfaces	Polypropylene (PP) Polyethylene (PE) (HDPE) (LDPE)	
Potential Secondary Surfaces	Fiber Reinforced Plastic (FRP) Polycarbonate (PC) Wood Aluminum Glass Thermoplastic Elastomers (TPE)	Rigid PVC ABS Acrylic (PMMA) Polystyrene Concrete
Not Recommended Surfaces Inconsistent results have been exhibited with substrates that contain oils and anti-stats.	PTFE (Teflon®) Silicone Surfaces Mold-release Agents Polyimide Nylons	

Handling/Curing Information

Directions for Use:

Important: Use only the specified 3M™ EPX™ Plus Applicator system or appropriate meter mix equipment to ensure the proper 10:1 mix ratio and mix. Hand mixing is not recommended, and may result in unpredictable results.

1) Apply adhesive to clean, dry substrates, which are free of loose paint, oxide films, oils, dust, mold release agents and all other surface contaminants. See the Surface Preparation section for specific substrate preparation methods:

35 ml cartridge:

Place duo-pak cartridge in EPX applicator. Remove cap. Remove rubber plug. Dispense and discard a small amount of adhesive to assure even ratio and free flow. Clear orifice if necessary. Use only orange 10:1 mixing nozzle by: 1) aligning nozzle notch with cartridge recess, and 2) twisting into place. Dispense and discard a small amount of adhesive through nozzle until the adhesive is mixed.

250 ml cartridge:

While holding duo-pak cartridge in an upright position, remove and discard the insert from the cartridge by unscrewing plastic nut and removing metal washer. Place cartridge in a 10:1, 250 ml EPX applicator.

Clean orifice if clogged; dispense and discard a small amount of adhesive to even pistons. Attach orange 10:1 EPX mixing nozzle by:

A) sliding the nozzle over the cartridge orifice until the nozzle notch **aligns** and **seats** against the tab on the neck of the cartridge and;

B) screwing the plastic nut back onto the cartridge to secure the nozzle. Dispense and discard a small amount of adhesive until the adhesive has a milky white appearance. If adhesive is clear, check the small orifice for debris.

Meter-Mix Equipment

Follow manufacturer's precautions, directions for use, and recommendations.

Handling/Curing Information *(continued)*

2) After the adhesive is applied, substrates must be mated within the worklife of the adhesive, 2-2.5 minutes for one-sided applications. Adhesive thickness less than .005" will yield unpredictable results. The joint design of the substrates should facilitate a .005" to .008" adhesive thickness at the bondline. Adhesive contains .008" micropheres for this purpose.

3) The bonded surfaces should be fixtured, or clamped, for at least 2 hours. The clamping pressure should be sufficient to keep the surfaces in contact during cure (typically 4-8 psi). Plastic parts can be designed to be self-fixturing, negating the need for external fixturing.

   Note: Heating the bondline to 150-175°F (66-80°C) for 30 minutes will speed curing. (The parts should be dwelled for a minimum of 10 minutes at room temperature prior to heating.)

4) Cured adhesive appearance: the adhesive will yellow with time; a rippling effect in the adhesive as it cures is normal and indicates that the adhesive is mixed properly and curing normally.

Approximate Coverage – By Size of Container [Figures do not include nozzle waste]

Bead Size	Linear ft per 35 ml	Linear ft per 250 ml	Linear ft per mixed gallon
1/2"	1.8	12.9	196
3/8"	3	23	350
1/4"	7	51.8	785
1/8"	28.9	206.7	3,130
1/16"	114.8	820	12,240

Coverage in square feet – (.008" bond line) [Figures do not include nozzle waste]

Square ft per 35 ml	Square ft per 250 ml	Square ft per mixed gallon
2	13	200

Surface Preparation

3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005 can bond polypropylene, polyethylene and other thermoplastic polyolefins without special surface preparation. However, all substrates should be clean, dry and free of paint, oxide films, oils, dust, mold release agents and other surface contaminants. The amount of surface preparation directly depends on the bond strength and environmental resistance desired by the user.

The following cleaning methods are suggested for common surfaces.

Steel and Aluminum

1) Wipe free of dust with oil-free solvent such as acetone or isopropyl alcohol.
2) Sandblast or abrade using clean fine grit abrasives (180 grit or finer).
3) Wipe again with solvent to remove loose particles.
4) If a primer is used, it should be applied within 4 hours after surface preparation. If 3M™ Scotch-Weld™ Structural Adhesive Primer 1945 B/A is used, apply a thin coating (.0005") on the metal surfaces to be bonded, air dry at 75°F (24°C) for 1 hr, then cure for 30 minutes at 180°F (82°C), 5 minutes at 250°F (122°C) or 3 hours at 75°F (24°C).

Note: Aluminum may also be acid etched. Follow the manufacturer's precautions and directions for this procedure.

Plastic/Rubber

1) Wipe with isopropyl alcohol.*
2) Abrade using fine grit abrasives (180 grit or finer).
3) Remove residue by wiping again with isopropyl alcohol.*

Glass

1) Solvent wipe surface using acetone.*

***Note:** When using solvents, be sure to extinguish all ignition sources and follow the manufacturer's precautions and directions for use.

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Storage

For maximum shelf life, store duo-pak cartridges and bulk containers at 40°F (4°C) or below.

Shelf Life

When stored at the recommended temperatures in the original unopened containers, this product has a shelf life of six months from date of shipment.

Precautionary Information

Refer to Product Label and Material Safety Data Sheet for health and safety information before using this product. For additional health and safety information, call 1-800-364-3577 or (651) 737-6501.

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-362-3550 or visit www.3M.com/adhesives. Address correspondence to: 3M Industrial Adhesives and Tapes Division, Building 21-1W-10, 900 Bush Avenue, St. Paul, MN 55106. Our fax number is 651-733-9175. In Canada, phone: 1-800-364-3577. In Puerto Rico, phone: 1-787-750-3000. In Mexico, phone: 52-70-04-00.

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ISO 9002

This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9002 standards.

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3M Center, Building 21-1W-10, 900 Bush Avenue
St. Paul, MN 55106

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